§ 98.392 GHGs to report.

Suppliers of petroleum products must report the CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product and natural gas liquid produced, used as feedstock, imported, or exported during the calendar year. Additionally, refiners must report CO_2 emissions that would result from the complete combustion or oxidation of any biomass co-processed with petroleum feedstocks.

§ 98.393 Calculating GHG emissions.

(a) Calculation for individual products produced, imported, or exported.

(1) Except as provided in paragraph (h) of this section, any refiner, importer, or exporter shall calculate CO_2 emissions from each individual petroleum product and natural gas liquid using Equation MM–1 of this section.

$$CO_{2i} = Product_i \star EF_i \qquad \text{(Eq. MM-1)}$$

Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid "i" (metric tons).
$Product_i$ = Annual volume of product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate. For natural gas liquids, volumes shall reflect the individual components of the product as listed in Table MM–1 of this subpart.
EF_i = Product-specific CO_2 emission factor (metric tons CO_2 per barrel).

(2) In the event that an individual petroleum product is produced as a solid rather than liquid any refiner, importer, or exporter shall calculate CO_2 emissions using Equation MM–1 of this section.

Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product "i" (metric tons).
$Product_i$ = Annual mass of product "i" produced, imported, or exported by the reporting party (metric tons). For refiners, this mass only includes products ex refinery gate.
EF_i = Product-specific CO_2 emission factor (metric tons CO_2 per metric ton of product).

(b) Calculation for individual products that enter a refinery as a non-crude feedstock.

(1) Except as provided in paragraph (h) of this section, any refiner shall calculate CO_2 emissions from each non-crude feedstock using Equation MM–2 of this section.

$$CO_{2j} = Feedstock_j \star EF_j \qquad \text{(Eq. MM-2)}$$

Where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).
$Feedstock_j$ = Annual volume of a petroleum product or natural gas liquid "j" that enters the refinery to be further refined or otherwise used on site (barrels). For natural gas liquids, volumes shall reflect the individual components of the product as listed in table MM–1 of this subpart.
EF_j = Feedstock-specific CO_2 emission factor (metric tons CO_2 per barrel).

(2) In the event that a non-crude feedstock enters a refinery as a solid rather than liquid, the refiner shall calculate CO_2 emissions using Equation MM–2 of this section.

Where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).
$Feedstock_j$ = Annual mass of a petroleum product "j" that enters the refinery to be further refined or otherwise used on site (metric tons).
EF_j = Feedstock-specific CO_2 emission factor (metric tons CO_2 per metric ton of feedstock).

(c) Calculation for biomass co-processed with petroleum feedstocks.

(1) Refiners shall calculate CO_2 emissions from each type of biomass that enters a refinery and is co-processed with petroleum feedstocks using Equation MM–3 of this section.

$$CO_{2m} = Biomass_m \star EF_m \qquad \text{(Eq. MM-3)}$$

Where:

CO_{2m} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each type of biomass "m" (metric tons).
$Biomass_m$ = Annual volume of a specific type of biomass that enters the refinery and is co-processed with petroleum feedstocks to produce a petroleum product reported

under paragraph (a) of this section (barrels).

EF_m = Biomass-specific CO_2 emission factor (metric tons CO_2 per barrel).

(2) In the event that biomass enters a refinery as a solid rather than liquid and is co-processed with petroleum feedstocks, the refiner shall calculate CO_2 emissions from each type of biomass using Equation MM–3 of this section.

Where:

CO_{2m} = Annual CO_2 emissions that would result from the complete combustion or oxi-

dation of each type of biomass "m" (metric tons).

$Biomass_m$ = Total annual mass of a specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported under paragraph (a) of this section (metric tons).

EF_m = Biomass-specific CO_2 emission factor (metric tons CO_2 per metric ton of biomass).

(d) *Summary calculation for refinery products.* Refiners shall calculate annual CO_2 emissions from all products using Equation MM–4 of this section.

$$CO_{2r} = \sum (CO_{2i}) - \sum (CO_{2j}) - \sum (CO_{2m}) \qquad \text{(Eq. MM-4)}$$

Where:

CO_{2r} = Annual CO_2 emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids (ex refinery gate) minus non-crude feedstocks and any biomass to be co-processed with petroleum feedstocks.

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid "i" (metric tons).

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).

CO_{2m} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each type of biomass "m" (metric tons).

(e) *Summary calculation for importer and exporter products.* Importers and exporters shall calculate annual CO_2 emissions from all petroleum products and natural gas liquids imported or exported, respectively, using Equations MM–1 and MM–5 of this section.

$$CO_{2x} = \sum (CO_{2i}) \qquad \text{(Eq. MM-5)}$$

Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid "i" (metric tons).

CO_{2x} = Annual CO_2 emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids.

(f) *Emission factors for petroleum products and natural gas liquids.* The emis-

sion factor ($EF_{i,j}$) for each petroleum product and natural gas liquid shall be determined using either of the calculation methods described in paragraphs (f)(1) or (f)(2) of this section. The same calculation method must be used for the entire quantity of the product for the reporting year. For refiners, the quantity of a product that enters a refinery (i.e., a non-crude feedstock) is considered separate from the quantity of a product ex refinery gate.

(1) *Calculation Method 1.* For solid products, use the default carbon share factor (i.e., percent carbon by mass) in column B of Table MM–1 of this subpart for the appropriate product. For all other products, use the default CO_2 emission factor listed in column C of Table MM–1 of this subpart for the appropriate product.

(2) Calculation Method 2.

(i) For solid products, develop emission factors according to Equation MM–6 of this section using a value of 1 for density and direct measurements of carbon share according to methods set forth in § 98.394(c). For all other products, develop emission factors according to Equation MM–6 of this section using direct measurements of density and carbon share according to methods set forth in § 98.394(c).

$$EF_{i,j} = Density \star Carbon\ Share \star (44/12) \quad (Eq.\ MM\text{-}6)$$

Where:

$EF_{i,j}$ = Emission factor of the petroleum product or natural gas liquid (metric tons CO_2 per barrel or per metric ton of product).

Density = Density of the petroleum product or natural gas liquid (metric tons per barrel for non-solid products, 1 for solid products).

Carbon share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

44/12 = Conversion factor for carbon to carbon dioxide.

(ii) If you use a standard method that involves gas chromatography to determine the percent mass of each component in a product, calculate the product's carbon share using Equation MM–7 of this section.

$$Carbon\ Share = \sum \left(\%Composition_{i...n} \star \%Mass_{i...n} \right) \quad (Eq.\ MM\text{-}7)$$

Where:

Carbon Share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid.

$\%Composition_{i**n}$ = Percent of total mass that each molecular component in the petroleum product or natural gas liquid represents as determined by the procedures in the selected standard method.

$\%Mass_{i***n}$ = Percent of total mass that carbon represents in each molecular component of the petroleum product or natural gas liquid.

(g) *Emission factors for biomass co-processed with petroleum feedstocks.* Refiners shall use the most appropriate default CO_2 emission factor (EF_m) for biomass in Table MM–2 of this subpart to calculate CO_2 emissions in paragraph (c) of this section.

(h) *Special procedures for blended biomass-based fuels.* In the event that some portion of a petroleum product is biomass-based and was not derived by co-processing biomass and petroleum feedstocks together (i.e., the petroleum product was produced by blending a petroleum-based product with a biomass-based fuel), the reporting party shall calculate emissions for the petroleum product according to one of the methods in paragraphs (h)(1) through (h)(4) of this section, as appropriate.

(1) A reporter using Calculation Methodology 1 to determine the emission factor of a petroleum product shall calculate the CO_2 emissions associated with that product using Equation MM–8 of this section in place of Equation MM–1 of this section.

$$CO_{2i} = Product_i \star EF_i \star \%Vol_i \quad (Eq.\ MM\text{-}8)$$

Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product "i" (metric tons).

$Product_i$ = Annual volume of each petroleum product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.

EF_i = Petroleum product-specific CO_2 emission factor (metric tons CO_2 per barrel) from Table MM–1 of this subpart.

$\%Vol_i$ = Percent volume of product "i" that is petroleum-based, including 2.5% of the volume of any ethanol product blended into a petroleum-based product to represent the denaturant in that ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(2) A refinery using Calculation Methodology 1 of this subpart to determine the emission factor of a non-crude petroleum feedstock shall calculate the CO_2 emissions associated with that feedstock using Equation MM–9 of this section in place of Equation MM–2 of this section.

$$CO_{2j} = Feedstock_j \star EF_i \star \%Vol_j \qquad (Eq. MM\text{-}9)$$

Where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).

$Feedstock_j$ = Annual volume of each petroleum product "j" that enters the refinery as a feedstock to be further refined or otherwise used on site (barrels).

EF_j = Non-crude petroleum feedstock-specific CO_2 emission factor (metric tons CO_2 per barrel).

$\%Vol_j$ = Percent volume of feedstock "j" that is petroleum-based, including 2.5% of the volume of any ethanol product blended with the petroleum-based product to represent the denaturant in that ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(3) A reporter using Calculation Methodology 2 of this subpart to determine the emission factor of a petroleum product must calculate the CO_2 emissions associated with that product using Equation MM–10 of this section in place of Equation MM–1 of this section.

$$CO_{2i} = \left(Product_i \star EF_i\right) - \left(Product_i \star EF_m \star \%Vol_m\right) \qquad (Eq. MM\text{-}10)$$

Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each product "i" (metric tons).

$Product_i$ = Annual volume of each petroleum product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.

EF_i = Product-specific CO_2 emission factor (metric tons CO_2 per barrel).

EF_m = Default CO_2 emission factor from Table MM–2 of this subpart that most closely represents the component of product "i" that is biomass-based.

$\%Vol_m$ = Percent volume of petroleum product "i" that is biomass-based, not including 2.5% of the volume of any ethanol product blended with the petroleum-based product, which represents the denaturant in that ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(4) A refiner using Calculation Methodology 2 of this subpart to determine the emission factor of a non-crude petroleum feedstock must calculate the CO_2 emissions associated with that feedstock using Equation MM–11 of this section in place of Equation MM–2 of this section.

$$CO_{2j} = \left(Feedstock_j \star EF_j\right) - \left(Feedstock_i \star EF_m \star \%Vol_m\right) \qquad (Eq. MM\text{-}11)$$

Where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).

$Feedstock_j$ = Annual volume of each petroleum product "j" that enters the refinery to be further refined or otherwise used on site (barrels).

EF_j = Feedstock-specific CO_2 emission factor (metric tons CO_2 per barrel).

EF_m = Default CO_2 emission factor from Table MM–2 of this subpart that most

closely represents the component of petroleum product ''j'' that is biomass-based.

%Vol$_m$ = Percent volume of non-crude feedstock ''j'' that is biomass-based, not including 2.5% of the volume of any ethanol product blended with the petroleum-based product, which represents the denaturant in that ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

§ 98.394 Monitoring and QA/QC requirements.

(a) *Determination of quantity.* (1) The quantity of petroleum products, natural gas liquids, biomass, and crude oil shall be determined as follows:

(i) Where an appropriate standard method published by a consensus-based standards organization exists, such a method shall be used. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).

(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, industry standard practices shall be followed.

(iii) For products that are liquid at 60 degrees Fahrenheit and one standard atmosphere, all measurements of quantity shall be temperature-adjusted and pressure-adjusted to these conditions. For all other products, reporters shall use appropriate standard conditions specified in the standard method; if temperature and pressure conditions are not specified in the standard method or if a reporter uses an industry standard practice to determine quantity, the reporter shall use appropriate standard conditions according to established industry practices.

(2) All measurement equipment (including, but not limited to, flow meters and tank gauges) used for compliance with this subpart shall be appropriate for the standard method or industry standard practice followed under paragraph (a)(1)(i) or (a)(1)(ii) of this section.

(b) *Equipment calibration.* (1) All measurement equipment shall be calibrated prior to its first use for reporting under this subpart, using an appropriate standard method published by a consensus based standards organization or according to the equipment manufacturer's directions.

(2) Measurement equipment shall be recalibrated at the minimum frequency specified by the standard method used or by the equipment manufacturer's directions.

(c) *Procedures for Calculation Methodology 2 of this subpart.* (1) Reporting parties shall collect one sample of each petroleum product or natural gas liquid on any day of each calendar month of the reporting year in which the quantity of that product was measured in accordance with the requirements of this subpart. For example, if a given product was measured as entering the refinery continuously throughout the reporting year, twelve samples of that product shall be collected over the reporting year, one on any day of each calendar month of that year. If a given product was only measured from April 15 through June 10 of the reporting year, a refiner would collect three samples during that year, one during each of the calendar months of April, May and June on a day when the product was measured as either entering or exiting the refinery. Each sample shall be collected using an appropriate standard method published by a consensus-based standards organization.

(2) Mixing and handling of samples shall be performed using an appropriate standard method published by a consensus-based standards organization.

(3) *Density measurement.* (i) For all products that are not solid, reporters shall test for density using an appropriate standard method published by a consensus-based standards organization.

(ii) The density value for a given petroleum product shall be generated by either making a physical composite of all of the samples collected for the reporting year and testing that single sample or by measuring the individual samples throughout the year and defining the representative density value for the sample set by numerical means, i.e., a mathematical composite. If a